

Not satisfied with impressions, the American Association of Vital Records and Public Health Statistics has gathered some facts regarding recruitment, training, and salaries.

Statisticians in State Health Departments

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IN RECENT YEARS, public health statisticians, like most other public health personnel, have become aware of severe shortages in their profession. Factual information has been inadequate, however, to establish trends in recruitment, training, and salaries.

Responsive to expressed comments regarding this problem, Dr. Albert E. Bailey, former president of the American Association of Vital Records and Public Health Statistics, appointed a Committee on Recruitment, Training, and Salaries "to collect information on what is happening in the various areas with regard to vacancies, new appointments, inservice training, university training institutes, salary changes, and present salary levels." The committee consisted of the author as chairman, Nancy W. Lucas, Ohio State Department of Health, and Melvin R. Wise, Arizona State Department of Health. It was appointed July 1, 1959, and presented its report at the biennial meeting held in Washington, D.C., June 1960. This paper summarizes the most important findings.

To carry out its charge, the committee sought data by means of two questionnaires: one to the heads of the statistical offices of the State, Territorial, and certain city health departments and another to the heads of the departments of biostatistics at the schools of public health. Three health departments with large statistical

units (California State, New York City, and New York State) supplied additional information.

Positions and Salaries

The questionnaire for the health departments was mailed in the spring of 1960 to the 50 States, the 5 cities which are considered independent of the States for vital statistics and registration purposes (Baltimore, Boston, District of Columbia, New Orleans, and New York), and Puerto Rico and the Virgin Islands. Fifty-one of the departments responded, and these are hereafter termed "State" health departments. No reply was received from Louisiana, Minnesota, Nevada, Oregon, South Carolina, or West Virginia. Although these States have some statistical positions, their omission should not seriously alter the results.

The questionnaire defined positions for public health statisticians as "statistical positions requiring a college degree, not necessarily in mathematics or statistics." Although professionally trained statisticians might prefer a more restrictive definition, the committee decided that this definition would obtain information which would be of greatest use to members of the association.

Replies to the questionnaire indicated a total of 306 statistical positions (table 1). Six agencies reported no such positions, and an additional 24 reported fewer than four each. Only six agencies reported 10 or more positions each: Tennessee (10), Maryland (12), Massachusetts (15), New York State, exclusive of

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New York City (24), New York City (44), and California (65). These few large units account for more than one-half of the positions listed in this study.

Fifty-six (18 percent) of the 306 positions were reported vacant. Sixteen health departments reported these vacancies. The maximum number was 14, in New York City, which had a vacancy rate of 32 percent. New York State, with 24 positions, had 9 vacancies, a rate of 38 percent. California reported that 15 percent of its positions were vacant. Those

departments with large statistical offices (10 or more statistical positions each) had a vacancy rate of 24 percent, while the rate in other departments was only 12 percent.

The range of entering salaries for all positions was very wide, from \$2,520 to \$12,600. Eight positions had entering salaries of less than \$3,000 (table 2). Starting salaries for 281 positions fell between \$3,000 and \$7,999. Only 17 positions had entering salaries of \$8,000 or more. The modal entering salary was between \$4,000 and \$4,999.

As might be expected, the vacancies tended to concentrate toward the lower end of the salary scale. Twenty-nine percent of the 90 positions with starting salaries of \$4,000-\$4,999 were vacant. This salary bracket had the greatest number of positions, the greatest number of vacancies, and the highest vacancy rate.

Table 1. Number of positions for public health statisticians, by size of staff, as reported by State health departments,¹ 1960

Number of positions in agency	Number of agencies	Number of positions
Total.....	51	306
0.....	6	7
1.....	7	18
2.....	9	24
3.....	8	8
4.....	2	25
5.....	5	24
6.....	4	21
7.....	3	
8.....	0	
9.....	1	9
10 or more.....	6	170

¹ Based on data from 44 States; Baltimore, Boston, District of Columbia, New Orleans, and New York; and Puerto Rico and the Virgin Islands.

Table 2. Positions and vacancies for public health statisticians, by entering salary, as reported by State health departments,¹ 1960

Entering salary	Number of positions	Vacancies	
		Number	Per cent
Total.....	306	56	18
\$2,000-\$2,999.....	8	2	14
\$3,000-\$3,999.....	35	4	
\$4,000-\$4,999.....	90	26	29
\$5,000-\$5,999.....	73	9	12
\$6,000-\$6,999.....	36	7	19
\$7,000-\$7,999.....	47	5	11
\$8,000-\$8,999.....	3	1	18
\$9,000-\$9,999.....	8	1	
\$10,000 and over..	6	1	

¹ See footnote, table 1.

Recruitment

Recruitment problems were explored by means of a question on the health department questionnaire which asked what obstacles were evident to the respondents in their recruitment efforts. Of the 45 agencies reporting statistical positions, only 5 reported no problems. Among the remainder, the chief obstacles mentioned were economic factors (primarily low salaries) and lack of qualified applicants. The complete range of replies from the 40 agencies follows. The total of responses exceeds the number of agencies because of multiple answers.

<i>Obstacles to recruitment</i>	<i>Number of responses</i>
Economic factors.....	48
Low salary.....	37
Better opportunities elsewhere.....	8
Better fringe benefits elsewhere.....	3
Lack of qualified applicants.....	15
Lack of interest in statistical positions.....	3

The effect of low salaries is substantiated by the relation found between number of vacancies and entering salaries, as shown in table 2. Among the 133 positions with starting salaries of less than \$5,000, 32 (24 percent) were vacant, whereas among the 173 positions above that salary, only 24 (14 percent) were vacant.

The lack of qualified applicants was verified by the New York State Department of Health, which reported the results of a special recruitment drive for statistician-trainees (salary, \$4,600 a year). The first step was a letter in February 1960 to the placement offices of each of 77 colleges in the State apprising them of opportunities in health statistics and mentioning the State's professional career tests. These examinations are given twice annually to college seniors, and candidates for trainee positions are selected from resulting eligibility lists. The letter closed with an offer to send health department representatives to any school to discuss the examinations and career opportunities with interested students. In response to requests for information, representatives traveled to six campuses in March 1960. Three students were interested enough to request an additional interview and took the examination. Before the end of the school year, one of these had already accepted a position in private industry. The remaining two students were from a college in New York City, an area which offers new graduates more lucrative jobs than they could get in State service in Albany.

Furthermore, New York State reported that the eligibility lists were of limited usefulness because of their timing. Although students can take the examination during their senior year, the lists are not released until late July or August. The delay is due to the mechanics of clearing credentials and certifying the lists. By that time, most applicants are committed to other employment.

Loss of Personnel

The gains which might be realized through a fruitful recruitment program could be offset by a rapid turnover of personnel. Therefore, the health agencies were asked to specify the chief causes of loss of public health statisticians. Among the 45 agencies reporting statistical positions, 2 failed to answer this question, and 2 reported no problems. Among the remaining 41 replies, reasons for loss of personnel were, again, economic. Next in importance was natural attrition: marriage, retirement, or death. The full range of replies was as follows:

<i>Reason for leaving</i>	<i>Number of responses</i>
Economic factors.....	37
Low salary.....	25
Better opportunities elsewhere.....	7
Lack of opportunities for promotion.....	5
Personal (marriage, retirement, death).....	13
Preference for another field of work.....	2
Inability to produce required work.....	1
Reduction in force.....	1

For another study (unpublished), the State health departments in New York and California pooled information for a 5-year period (1954-58) to ascertain reasons for loss of personnel, with the following results:

<i>Reason for leaving</i>	<i>Number of persons</i>	
	<i>California</i>	<i>New York State</i>
Employment in another statistical position.....	9	9
Personal (moved with husband, motherhood).....	13	4
Returned to school.....	4	3
Preference for another occupation.....	2	4
Resignation requested.....	2	1
	30	21

During this period, salary levels and promotional opportunities were decidedly more advantageous in California than in New York State, and this difference is reflected in the distribution above. The chief reason for resignation in California was personal, while in New York State the chief reason was to change to another statistical position with a higher salary. About one-third of the resignations in California and almost one-half of those in New York State were for employment in other statistical jobs, which corresponds to the group of economic reasons listed in the questionnaire to the States.

The situation is aggravated as economic pressures increase. The New York City Department of Health reported its experience over a 5-year period (1955-59) with two types of positions.

	<i>Assistant statistician</i>	<i>Statistician</i>
Entering salary.....	\$4,250	\$5,150
Number of budgeted positions ¹	24	9.8
Number of vacancies ¹	10.6	1.4
Percent turnover ¹	44	14

¹ Annual average.

Thus at the lower salary the turnover is about half. The adverse effects of such a turnover rate on the operations of a statistical office are many: lack of continuity, unfinished projects, costly training of a revolving pool of new, untrained incumbents, to mention a few.

Academic Training

Of the 250 persons employed in statistical positions in the health agencies, 123 (49 percent) were college graduates with at least one additional year of full-time graduate training in statistics, mathematics, public health, or other pertinent field.

Thirty-two of the health agencies reported that their States provide funds (either State or Federal, or both) for graduate training in biostatistics. One department, however, specified that recent legislation precludes the use of State funds for training for credit. At the time the questionnaires were completed, 6 agencies had 15 statisticians in training, as follows: 9 with Federal funds; 5, employees' funds; and 1, State funds. Thus, the major portion of graduate training of statisticians in State health agencies is being financed by Federal funds.

To supplement these data, the questionnaire to the schools of public health was intended to obtain information regarding trends in number of persons receiving training in biostatistics and adequacy of training funds. Eight of the 10 schools which were sent a questionnaire re-

plied. The reply from one, with only four graduate students in each of the last two academic years, was excluded because the responses were incomplete. The following statements are therefore based on answers from seven schools. Foreign students as well as U.S. citizens are included.

The number of candidates in training and the number of degrees awarded in biostatistics in each of the last 5 academic years are shown in table 3. Only two schools reported candidates for bachelor's degrees in biostatistics. At this level, the number of candidates more than doubled during the 5-year period, but dropped slightly in the 1959-60 academic year. At the master's degree level, the number of candidates almost doubled, but showed no increase in the 1959-60 year over the preceding year.

Only at the doctoral level was there a steady increase over this 5-year period, when the number of candidates trebled. In part, this reflects the fact that a longer period of time is required to obtain the doctoral degree, and the same person is therefore reported in successive years. The trend in number of degrees granted, however, is consistent with the upward trend in number of students in training. The total number of degrees awarded increased from 16 to 45 during the first 4 years of the period, but dropped to 30 in the most recent year.

During this period of growth, increased Federal funds became available for training biostatisticians. A number of statisticians

Table 3. Candidates in training and degrees awarded in biostatistics by schools of public health,¹ academic years, 1955-56 to 1959-60

Academic year	Candidates in training				Degrees granted			
	Total	Bachelor's degree ²	Master's degree	Doctor's degree	Total	Bachelor's degree ²	Master's degree	Doctor's degree
Total	142	21	98	23				
1959-60	102	12	55	35	30	4	20	6
1958-59	99	15	55	29	45	7	29	9
1957-58	81	12	46	23	30	4	22	4
1956-57	61	8	31	22	21	3	16	2
1955-56	46	5	29	12	16	3	11	2

¹ Based on data from seven schools of public health: California, Columbia, Harvard, Minnesota, North Carolina, Tulane, and Yale.

² Only California and Minnesota indicated candidates.

already working in the field, as well as persons new to the field, took advantage of this opportunity to obtain a degree. Hence, the question arises: What is the net gain from this training program? The schools were asked to indicate what their students in the 1959-60 year were doing the previous year and what they expected to be doing the succeeding year. The seven schools reported as follows for the 99 students in training in 1959-60:

<i>Status</i>	<i>Preceding year</i>	<i>Succeeding year</i>
In academic training-----	70	63
Employed as biostatistician..	16	21
Employed in other work-----	13	15

Thus, two-thirds of the 1959-60 students planned to continue their training in 1960-61. The number of employed biostatisticians withdrawn for training in 1959 was 16, and it was anticipated that 21 would return to such employment in 1960. The difference is a net gain of only five professionally trained persons from seven schools, and these may include foreign students. This increase is far from adequate to fill the many vacancies reported by the State agencies, to say nothing of the needs of other governmental agencies, universities, and research institutions.

Lack of training funds does not seem to be a problem. The schools were asked to indicate whether sufficient funds were available in the 1959-60 academic year to train all qualified applicants who requested financial aid. Six schools answered "Yes"; only one replied "No." One of the six volunteered the information, however, that although sufficient funds were available for the 1959-60 year, this would not be true for the 1960-61 year.

Current Activities

On their questionnaires the health departments indicated many attempts to correct their personnel problems. California reported a one-step adjustment in minimum and maximum salaries for all grades effective July 1, 1959, and the possibility of another such increase July 1, 1960. Maryland mentioned a 5 percent salary increase and establishment of a new position: director, program evaluation. Michigan reported the possibility of upgrading one posi-

tion. New York City specified an increase of one salary step for almost all positions. New York State reported an impending increase in the number of higher positions at the cost of abolishing lower positions, with a net decrease in total budget. Tennessee said that positions and salaries were under study and that a new setup might be expected by July 1960.

With regard to training, Illinois reported that it had received approval of a plan for inservice and academic training because of unsuccessful results of active recruitment efforts. Texas, however, reported passage of a law prohibiting use of State funds for formal training for credit.

This listing is incomplete because this information was volunteered. No specific question regarding changes was asked, but the information is indicative of widespread recognition of a need for corrective action.

Discussion

The study clearly establishes that a shortage of statisticians exists in State health agencies. This shortage can be alleviated in several ways: by retaining trained personnel, by recruiting trained personnel, or by recruiting untrained personnel. The study indicates also that economic factors, principally low salaries, are the leading cause of loss of personnel, as well as the most common barrier to recruitment of new personnel. Furthermore, not nearly enough biostatisticians are currently completing their training at the schools of public health to fill the needs, despite availability of financial assistance.

Possible solutions open to the health agencies are limited. They can offer higher salaries or better fringe benefits. They can provide opportunities for advanced training, with commensurate increase in economic benefits on completion of training. Or they can lower job qualifications with no increase in salary.

Agencies offering higher salaries are undoubtedly in the best position to recruit trained personnel. These agencies can therefore be relatively selective in their choices, and they usually do not have to bear the cost of training. High salaries are also an inducement to employees to remain in their jobs, thus mitigating the problem of discontinuity of service.

In recruiting persons new to the field, statistical offices must compete with many other employers for those persons with sufficient mathematical training to form a base for statistical work. Offering such persons the opportunity for graduate training can be an effective recruiting device. However, unless the hiring agency recognizes the greater economic value of these employees after training, they may soon be enticed elsewhere by higher salaries.

Lowering job qualifications may appear an attractive solution, at least temporarily, but the disadvantages must not be overlooked. At first, employees hired under such a policy lack technical competence to perform in a professional capacity. Then, after a short period of employment, if they are capable and ambitious, it is likely they will seek the academic training they lack. The hiring agency may or may not finance such training, but in either event, the employee's leaving means discontinuity in service. Unless the agency provides the training, the employee is usually not obligated to return to the agency after completing his training, and unless the agency is willing to recognize the higher economic value of this trained person, the separation may be permanent. There follows the hiring of a new untrained person to start the cycle over again. If the pattern is repeated often enough, an agency operating under this policy becomes a recruiter of untrained individuals whose ultimate greater capabilities benefit only other agencies.

In the balancing of these various considerations, the heads of the statistical offices are often not the deciding force. Generally, statistical positions are grouped with other positions in the class of professional personnel. For example, the starting salary for entering statistician-trainees in New York State is the same as for other trainees: bacteriologist, planning, economist, education, or forester, to name a few. Usually, uniform policy decisions regarding the professional class are applied by the civil service or budget branch of a State government. Broad administrative decisions regarding this class without attention to shortages in specific categories may aggravate rather than resolve

the issue. It should be recognized that statisticians are generally drawn from a small pool of mathematically trained persons for whom a great deal of competition exists. In this respect, they differ from some of the less technical professions.

Summary

Questionnaires covering salaries, recruitment, and training of public health statisticians were completed by 46 State and Territorial and 5 "independent" city health departments and by 7 schools of public health. The health agencies reported that 18 percent of all their positions for health statisticians were vacant, demonstrating that a serious problem exists in filling these positions. Their replies strongly indicate, further, that economic factors are the chief obstacles to filling these positions. Salaries in the \$4,000-\$4,999 bracket are accompanied by a vacancy rate of 29 percent. Also, economic factors lead all other causes as a reason for loss of personnel.

The current rate of training public health statisticians at the schools of public health is not adequate to fill the needs of these agencies. Only at the doctoral level did the number of candidates in training at the schools in 1959-60 increase over the previous year, although there was an increase at all levels over the 5-year period 1955-56 to 1959-60.

This slackening trend does not seem, however, to be due to any serious lack of funds for training biostatisticians. Thirty-two of the health agencies indicated that training funds were available, but only six had employees in training during the 1959-60 academic year. Six of the seven schools of public health reported adequate funds for all qualified applicants for financial assistance.

Thus, vacancies among public health statistical positions in State public health agencies apparently are not due to lack of training opportunities. They are related chiefly to economic barriers to recruitment, economic reasons for resignation, and a short supply of qualified persons.